Claims

1. A process for converting methane to produce hydrogen or hydrogen equivalents, *characterised* in that methane is subjected anaerobically to the activity of methane-oxidising bacteria of the order of the *Thermotogales*.

2. A process according to claim 1, wherein the methane-oxidising bacteria comprise a *Thermotoga* species.

3. A process according to claim 2, wherein the *Thermotoga* species comprises *T. maritima* or *T. lettingae*.

4. A process according to any one of claims 1-3, which is carried out at a temperature between 25 and 90°C.

5. A process according to any one of claims 1-4, which is carried out in the presence of thiosulphate.

6. A process for reducing chemical compounds by biological reduction using hydrogen equivalents, *characterised* in that the hydrogen equivalents are produced by subjecting methane to anaerobic methane-oxidising bacteria of the order of the *Thermotogales*.

7. A process according to claim 6, wherein sulphur compounds are reduced to sulphide using a sulphate-reducing species.

8. A process according to claim 7, wherein the sulphur compounds comprise sulphate and/or sulphite.

9. A process according to claim 7 or 8, wherein the anaerobic methane-oxidising species comprises a *Thermotoga, Thermosipho* or *Fervidobacterium* species.

10. A process according to claim 7 or 8, wherein the sulphate-reducing species comprises an *Archaeglobus, Desulfotomaculum, Desulforomonas, Desulfovibrio* or *Thermodesulfovibrio* species.

11. A process according to claim 6, wherein metals are reduced from a high valence state to a low-valence or zero-valence state.

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12. A process according to any one of claims 6-11, wherein a temperature of between 25 and 90°C is used.

13. A mixed culture, containing one ore more anaerobic methane-oxidising *Thermotogales* species, and one or more sulphate-reducing or metal-reducing *Archaeglobus, Desulfotomaculum, Desulforomonas* or *Desulfovibrio* species.

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